

Remarks

I. Introduction

This is in response to the Final Office Action dated July 1, 2008 and is being submitted simultaneously with a Request for Continued Examination pursuant to 37 CFR § 1.114.

The Office Action rejected claims 1-32 under 35 U.S.C. § 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The Office Action rejected claims 1, 6-14, 17-26, 29, 31 and 32 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent no. 6,996,828 (Kimura) in view of Halang, "Real-time Systems" pages 291-313 (Halang), and further in view of U.S. Patent no. 5,748,468 (Notenboom). The Office Action also rejected claims 2-5, 15, 27, and 28 under 35 U.S.C. § 103(a) as being unpatentable over Kimura in view of Halang, and further in view of Notenboom, and further in view of U.S. Patent no. 6,725,260 (Philyaw). The Office Action also rejected claims 16 and 30 under 35 U.S.C. § 103(a) as being unpatentable over Kimura in view of Halang, and further in view of Notenboom, and further in view of U.S. Publication no. 2003/0041088 (Wilson).

Applicants herein amend claims 1, 14, 22, and 32. Applicants herein cancel claim 4. Claims 1-3 and 5-32 are pending.

II. Rejections under 35 U.S.C. § 112

The Office Action rejected claims 1-32 under 35 U.S.C. § 112 as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In particular, the Office Action noted that in independent claims 1, 14, 22, and 32, the phrase "said soft programmable

logic controller (PLC) comprised by a single computer" is indefinite because software cannot be "comprised by" a computer.

Applicants herein amend claims 1, 14, 22, and 32, replacing the phrase "comprised by" with "executed on" as suggested in the Office Action. Accordingly, independent claims 1, 14, 22, and 32, as amended, as well as dependent claims 2, 3, and 5-13, 15-21, and 21-31 are not indefinite. Therefore, Applicants respectfully request the withdrawal of the rejection under 35 U.S.C. § 112.

III. Rejections under 35 U.S.C. §103

Independent claims 1, 14, 22, and 32 were rejected as being unpatentable over Kimura in view of Halang and further in view of Notenboom. In order to "establish *prima facie* obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art." *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). Furthermore, "all words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). See also MPEP § 2143.03. The cited references, either alone or in combination, do not disclose all of the claim limitations of the amended independent claims. Therefore, Applicants respectfully request the withdrawal of the rejection of independent claims 1, 14, 22, and 32 and dependent claims 2, 3, 5-13, 15-21, and 23-31 under 35 U.S.C. §103(a).

The present invention relates to a system and method for automatically reassigning an interface card and devices associated with a programmable logic controller system from a first operating environment to a second operating environment. In particular, the specification describes a method for adequately allocating resources between the operating environments that control the industrial machinery, thereby providing greater assurance of adequate response times to the controlled devices.

As described in the specification starting on page 6, line 22, a PC-based Programmable Logic Controller (PLC) environment includes a computer that controls several industrial devices in a manufacturing environment. As shown in Figure 1, the PLC interfaces with these industrial devices via expansion cards. The structure of PLC communications to the various industrial devices, disclosed on page 7, line 17, is based on a "scan cycle", which is a cycle of communication to all industrial devices that are interfaced to the PLC.

Page 6, lines 10-20 of the specification describes how the demands on the PLC operating system may increase, usually as a result of the addition of industrial devices to the PLC. An increased demand for PLC real-time processing could adversely impact the PLC's efficiency and response times to the industrial devices under its control. As a result, the additional demands on the PLC may vary or delay the cycle of communications from the PLC to the industrial devices. A variance in the scan cycle timing could have a detrimental effect on the manufacturing operations of the industrial devices that require immediate processing.

Page 7, line 21 discloses one aspect of the invention. The operating system for a PC-based PLC is migrated to an environment where the scan cycle timing is not variable. A PLC operating environment with non-variable scan cycle timing provides greater assurance that the resources for the PLC will be adequately provided during the times of peak servicing and control of the industrial devices. This aspect of the present invention is reflected in independent claim 1, as amended. In particular, independent claim 1, as amended, recites the limitation, "wherein said second operating environment has non-variable scan cycle timing".

The combination of Halang, Kimura, Philyaw, and Notenboom does not disclose this limitation of independent claim 1, as amended.

Halang discloses the implementation of real-time systems for industrial computerized process automation. Halang, at page 119, discloses the use of the

ISO 8802.3 CSMA/CD bus specification and ISO 8802.4 token passing bus specification for the physical and medium access control layer as a means to achieve high average throughput, thereby enabling access to a transmission line in a “deterministic” time. The phrase “deterministic” is construed by a person having ordinary skill in the art to mean “adapted to process information and/or control a process in real-time.” (Declaration under 37 CFR § 1.132, Dr. Ronald D. Williams, September 22, 2003).

Halang discloses a deterministic or “real-time” operating system. Even though the PLC of Halang uses a deterministic or “real-time” operating environment, as further demands are placed on the PLC, its response time to the industrial devices may degrade. Thus, the scan cycle timing may vary in the deterministic or “real-time” operating environment as disclosed by Halang. A deterministic or “real-time” operating system is not the same as an operating system with non-variable scan cycle timing. An operating system with non-variable scan cycle timing will complete each scan cycle in substantially the same length of time regardless of the demands that are placed on the PLC. Halang does not disclose the use of such non-variable scan cycle timing for programmable logic controllers. Therefore, Halang does not disclose the limitation of “said second operating environment has non-variable scan cycle timing” as claimed in claim 1.

Kimura discloses a method for multi operating system configuration on a single computer. Kimura, at column 2, lines 32-44, discloses the division of the computer’s physical memory for each of a plurality of operating systems, thereby enabling a single computer to run a plurality of operating systems. However, the operating systems as disclosed by Kimura do not disclose the use of non-variable scan cycle timing. Therefore, Kimura does not disclose the limitation of “said second operating environment has non-variable scan cycle timing” as claimed in claim 1.

In the rejection of claims 2-5, the Office Action cites Philyaw, at column 13 lines 25-50 and at column 15, lines 20-25, as teaching an architecture for automatically configuring equipment where the first operating environment is non real-time and the second operating environment is a real-time operating environment. However, as described above, a real-time or non real-time operating environment is not the same as non-variable scan cycle timing. Philyaw does not disclose the use of non-variable scan cycle timing. Therefore, Philyaw does not disclose the limitation of "said second operating environment has non-variable scan cycle timing" as claimed in claim 1.

Notenboom discloses a co-processor resource manager by which the co-processor resources are allocated to processing various tasks. Notenboom, at column 3 lines 16-24, discloses that the co-processor resource manager communicates with device drivers that provide services to applications executing on a host processor. However, Notenboom does not disclose the use of non-variable scan cycle timing as a means to ensure that adequate resources are allocated to processing various tasks. Therefore, Notenboom does not disclose the limitation of "said second operating environment has non-variable scan cycle timing" as claimed in claim 1.

For the reasons stated above, neither Halang, Kimura, Philyaw, nor Notenboom, separately or in combination, discloses the limitation, "wherein said second operating environment has non-variable scan cycle timing" as recited in amended independent claim 1. Therefore, independent claim 1, as amended, is allowable over the cited art.

Independent claims 14, 22, and 32 have been amended in similar fashion to claim 1 and are also allowable based on the aforementioned reasons.

All remaining claims are dependent upon an allowable independent claim and are therefore also allowable.

IV. No New Matter has Been Added

No new matter has been added since all of the amendments to the claim are supported in the specification, drawings or claims as filed. The amendments to claims 1, 14, 22, and 32 are supported at least at page 7, line 21 of the specification as filed.

V. Conclusion

For the reasons discussed above, all pending claims are allowable over the cited art. Reconsideration and allowance of all claims is respectfully requested.

Respectfully submitted,



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Date: October 1, 2008
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